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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,582	01/16/2004	John Thomas Mariner	US 131067-2 60QZ	7994
42248	7590	08/31/2006	EXAMINER	
GEAM - QUARTZ IP LEGAL ONE PLASTICS AVENUE PITTSFIELD, MA 01201-3697			DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 08/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/759,582

Applicant(s)

MARINER ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 18-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Rejections of Claims 1-5, 7-9, 11 :

1) Rejection as anticipated by Masuda et al (2004/0107865)

Applicant has amended independent claim 1.

Applicant has argued that Masuda et al does not disclose all elements of invention of claims 1-5, 7-9 and 11, regarding claim limitations "shaft being substantially transverse to the platform" and "a top coating of a dielectric material superimposed on said first and second coatings, the top coating is composed of at least a material selected from the group consisting of a nitride, carbide, carbonitride or oxynitride of elements selected from a group consisting of B, Al, Si, Ga, refractory hard metals, transition metals, and combinations thereof".

Examiner responds that claim 1 recites interalia, a shaft extending substantially transverse to platform". Masuda et al teaches electrode 11 that supports substrate (platform) 6 and extends substantially transverse to substrate 6 (platform). Further, Masuda et al also teaches a top coating 4 of boron nitride that reads on claim 1 limitation. Accordingly rejection of claim 1 and dependent claims 2-5, 7-9, 11 as anticipated by Masuda et al under 35 USC 102 (e) is maintained.

2) New rejections of claims 1-5, 7-10 under 35 USC 103 (a)

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New references have been found - MacLeish et al (US Patent No. 6,113,984) and Honma et al (US Patent No. 5,478,436) that when combined read on claim 1 limitations. Accordingly claim 1 and dependent claims 2-5, 7-10 have been rejected under 35 USC 103 (a) as explained below.

3) Applicant's argument regarding common assignee for Masuda reference (US PGPUB 2004/0107865 is found persuasive. Accordingly previous rejection of claims 6, 10 and 12-17 under 35 USC 103 (a) has been withdrawn. However on reconsideration, claims 6, 11-17 have been rejected under 35 USC 103 (a) as explained below. Further, following comments are given in response to applicant's remarks in respect of these claims (as relevant now):

a) Rejection of claims 12, 15, 17 – Reference by Komino et al (US patent No. 5,478,429).

Applicant has argued that in Komino reference susceptor base 12 is not a shaft and Komino electrodes are not housed in the shaft.

Examiner responds that in Komino reference, base 31 (Figure 2) is not the shaft.

Komino teaches a pipe structure 5 (like a shaft) which comprises two electrical conductors 62 and 52. Thus Komino et al when combined with MacLeish et al and Honma et al reads on limitations of claims 12, 15 and 17. Accordingly these claims are rejected as explained below.

4) Rejection of Claim 17 – Reference by Kushihashi et al (US PGPUB No. 2003/0217767).

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Applicant argues that Kushihashi et al teaches a thermocouple protective tube and not an electrical conductor for connecting an electrode to an external source of power.

Examiner responds that Kushihashi et al deal with temperature measurement in high temperature and corrosive environment, including for semiconductor manufacturing processes (paragraph 0007) and is thus an analogous art. Thus it would be obvious to combine teaching of Kushihashi et al with MacLeish et al, Honma et al and Komino et al. Accordingly claim 17 is rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, 7-9, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Masuda (US 2003/0107865).

With respect to Claim 1: Masuda discloses a wafer processing device comprising: a platform for supporting an object to be heated, the platform comprises a substrate having upper and lower relatively flat surfaces, the platform is comprised of graphite (Fig. 1 Item 5, Paragraph 36); a shaft extending substantially transverse to the platform (Fig. 4 Item 11), the shaft is comprised of graphite (Paragraph 76 Lines 1-12); a first coating on at least one of the flat surfaces (Fig. 1 Item 2), with said first coating Fig. 1

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Item 2) composed of a nitride (Paragraph 36 Lines 2-6 and Paragraph 5); a second coating (Figure 1 Item 3) layer composed of pyrolytic graphite (Paragraph 36 Lines 2-6) disposed on the first coating in a patterned arrangement of predetermined geometry (Fig. 1 Item 4, Paragraph 5), the layer having at least two separate ends adapted for forming at least an electrode (Fig. 1 Item 3, Paragraph 36); and a top coating (Fig. 1 Item 4) of a dielectric material superimposed on said first and second coatings (Fig. 1 Item 4), the top coating is composed of a nitride (Paragraph 42 and 5).

With respect to Claim 2: Masuda discloses the device is an electrostatic chuck and the electrode is a chuck electrode (Paragraph 6).

With respect to Claim 3: Masuda discloses the device is a heater and the electrode is a heating element electrode (Paragraph 6).

With respect to Claim 4: Masuda discloses the graphite platform is one of a disk, platen, and a cylinder (Fig. 1, Paragraph 36).

With respect to Claim 5: Masuda discloses the graphite shaft is one of a rod and a hollow core (Fig. 4 Item 11).

With respect to Claim 7: Masuda discloses the patterned second coating is formed on said lower surface of said platform (Fig. 1 Item 3).

With respect to Claim 8: Masuda discloses the said pyrolytic graphite second coating layer is encapsulated in a nitride (Fig. 1 Item 4, Paragraph 5).

With respect to Claim 9: Masuda discloses the said pyrolytic graphite second coating layer is encapsulated in pyrolytic boron nitride (Fig. 1 Item 4, Paragraph 42 Lines 1-5).

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With respect to Claim 11: Masuda discloses the graphite shaft further inherently includes at least two electrical conductors for connecting the electrode to an external source of power (Fig. 5 Item 11), since the electrode needs to be connected to an external power supply through the shaft for the device to function according to how it is presented in Fig. 5.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1-5, 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacLeish et al (US Patent No. 6,113,984) in view of Honma et al (US Patent No. 5,478,436).

Regarding Claims 1, 4: MacLeish et al teach an apparatus (Figure 14) that includes a support (platform) 115 with upper and lower flat surfaces and a shaft 116 that extends transverse to the platform. MacLeish et al further teach that the support 115 and the shaft 116 are made from graphite (column 13, lines 45-60).

MacLeish et al do not teach wafer supporting platform with first, second and top coatings on the platform.

Honma et al teach an apparatus (Figure 3) for use in plasma processing comprising:

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a chuck (platform) 10 for supporting a wafer (object) 14, the platform comprises a substrate (body of disc shape) 21 having upper and lower relatively flat surfaces, the platform is comprised of graphite;

a first coating 23 of boron nitride formed on at least one of the flat surfaces;

electrodes 24a, 24b (second coating layer) composed of pyrolytic graphite disposed on the first coating and formed by masking and etching (in a patterned arrangement of predetermined geometry), the layer having at least two separate ends adapted for forming at least an electrode; and

a coating (third top coating) 26 of boron nitride (dielectric material) superimposed on said first and second coatings (column 3, line 45 to column 4, line 20).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use chuck (body) with first, second and top coatings as taught by Honma et al in the apparatus of MacLeish et al to achieve faster removal of wafer from the chuck (column 1, lines 55-60).

Regarding Claim 2: Honma et al teach that device 10 is an electrostatic chuck and the electrode 24a, 24b is chuck electrode.

Regarding Claim 3: Honma et al teaches that electrodes 25 may be used as heating element. Further, MacLeish et al teach that apparatus of Figure 14 can function as a device for heating the wafer by heating of susceptor 115 through radiant heating from lamps (Honma et al – column 4, lines 1-5 and MacLeish et al – Column 14, lines 5-25).

Regarding Claim 5: MacLeish et al teach that shaft 116 is of rod form (Figure 14 and column 13, line 56 to column 14, line 5).

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Regarding Claim 7: Honma et al teach that patterned second coating 25a, 25b is formed on lower surface of body (platform) 21 (Figure 3).

Regarding Claims 8, 9: Honma et al teach that pyrolytic graphite coating 24a, 24b, 25a, 25b is encapsulated in a pyrolytic boron nitride coating 26 (Figure 3 and column 4, lines 5-20).

Regarding Claim 10: MacLeish et al teach that graphite shaft 116 and the graphite susceptor (platform) 115 form a single unitary body (as an assembled unit). It is known in the art to use either individual parts and assemble them into a subs-assembly or use unitary structure of multiple parts, depending upon complexity of the relevant parts and economies of scale (column 13, lines 56 – 65).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over MacLeish et al (US Patent No. 6,113,984) in view of Honma et al (US Patent No. 5,478,436) as applied to Claim 1 and further in view of Chu et al (US 6,793,767).

Regarding Claim 6: MacLeish et al in view of Honma et al teach electrodes formed from pyrolytic graphite as a continuous elongated strip but do not teach that the strip arranged in at least one of electrical flow path has at least one of a spiral pattern, a serpentine pattern, a helical pattern, a zigzag pattern, a continuous labyrinthine pattern, a spirally coiled pattern, a swirled pattern, a randomly convoluted pattern, and combinations thereof.

Chu teaches an apparatus (Figure 2) that includes electrostatic electrodes 104 arranged in a spiral pattern (Column 3 Lines 10-20). MacLeish et al, Honma et al and Chu are

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analogous art because they are from the same field of endeavor, namely substrate holding devices.

At the time of invention it would have been obvious to a person of ordinary skill in the art to form the pyrolytic graphite strip of Macleish et al in view of Honma et al including the strip being arranged in at least one of electrical flow path to have a spiral pattern in view of the teaching of Chu. The suggestion or motivation for doing so would have been to provide an electrode pattern capable of distributing the electrode evenly across the substrate.

Claim 11, 12, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacLeish et al (US Patent No. 6,113,984) in view of Honma et al (US Patent No. 5,478,436) as applied to Claim 1 and further in view of Komino et al (US Patent No. 5,478,429).

Regarding Claims 11, 12, 15: MacLeish et al in view of Honma et al teach shaft and electrode but do not teach graphite shaft includes at least two electrical conductors for connecting the electrode to an external source of power.

Komino et al teach an apparatus (Figure 2) that includes a susceptor 32 with an electrostatic chuck 33 that includes an electrode 34 and a pipe structure (like a shaft) 51, 52 where two electrical conductors 62 and the outer pipe 52 are used for connecting the electrode 34 to an external power source 63. Komino et al also teach that the two electrical conductors are concentric with first conductor 62 being disposed within the second conductor (pipe 52) [Figure 2 and column 4, line 10 to column 5, line 15].

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It would have been obvious to a person of ordinary skill in the art to use two electrical conductors in the shaft as taught by Komino et al in the apparatus of MacLeish et al in view of Honma et al to enable supply electrical power to the electrode and connecting a lower electrode to an RF power supply without using a conventional coaxial cable, since coaxial cables require a cumbersome operation to connect a shielded line to a process chamber and the impedance of the apparatus may be change depending on the manner of connecting them.

Regarding Claim 16: Komino et al teach that the two electrical conductors 62, 52 have a common center (Figure 2).

Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacLeish et al (US Patent No. 6,113,984) in view of Honma et al (US Patent No. 5,478,436) and Komino et al (US Patent No. 5,478,429) as applied to Claim 11 and further in view of Kirchner et al (US Patent No. 5,811,820).

With respect to Claims 13,14: MacLeish et al in view of Honma et al and Komino et al teach all limitations of the claim including two electrical conductors but do not teach that two electrical conductors are disposed on opposite sides of the shaft

Kirchner et al teaches an ion source apparatus (Figure 22B) that includes a solid shaft 2202 coated with electrode layers 2206 and 2208 to enable supply RF power to the electrode sheets 2102 and where electrode 2206 is disposed opposite to electrode 2208 (Figure 22B and column 20, lines 8-20).

It would have been obvious to a person of ordinary skill in the art to form electrodes layers on the on the opposite sides of the shaft as taught by Kirchner et al in the

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apparatus of MacLeish et al in view of Honma et al and Komino et al to enable supply power as per configuration of the electrode plate to be connected to the shaft.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over MacLeish et al (US Patent No. 6,113,984) in view of Honma et al (US Patent No. 5,478,436) and Komino et al (US Patent No. 5,478,429) as applied to Claim 11 and further in view of of Kushihashi (US 2003/0217767).

With respect to Claim 17: MacLeish et al in view of Honma et al and Komino et al teach all limitations of the claim except that the said first electrical conductor is in a form of a graphite rod, the second electrical conductor is a hollow graphite rod, and wherein the first and second electrical conductors are separated by means of a coating layer comprising a material selected from the group of least a nitride, carbide, carbonitride or oxynitride of elements selected from a group consisting of B, Al, Si, Ga, refractory hard metals, transition metals, and rare earth metals, or complexes and/or combinations thereof.

Kushihashi discloses a first electrical conductor is in a form of a graphite rod (Fig. 2 Item 9 Paragraph 46), and a second electrical conductor is a hollow graphite rod (Fig. 2 Item 7 Paragraph 46), wherein the first and second electrical conductors are separated by means of a coating layer comprising the material pyrolytic boron nitride (Fig. 2 Item 8 Paragraph 46).

It would have been obvious to a person of ordinary skill in the art to form the first electrical conductors' configuration as taught by Kushihashi et al in the apparatus of MacLeish et al in view of Honma et al and Komino et al to enable provide power

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connection to the electrode with an excellent resistance to high temperatures
(Paragraph 31 Lines1-4).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



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Art Unit 1763